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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/811,153

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8479

293 7590 12/31/2007  
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EXAMINER

FERGUSON, LAWRENCE D

ART UNIT

PAPER NUMBER

1794

MAIL DATE

DELIVERY MODE

12/31/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/811,153		LU ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Lawrence D. Ferguson		1794	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

**A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.**

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 October 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15, 17-20, 22-26 and 30-53 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15, 17-20, 22-26, 30-39 and 41-53 is/are rejected.
- 7) ☒ Claim(s) 40 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Amendment***

1. This action is in response to the amendment mailed November 9, 2006. Claims 1, 9, 10, 13, 14, 19, 26, 43, 47-49 were amended and claims 50-53 were added rendering claims 1-15, 17-20, 22-26 and 30-53 pending.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

### ***Claim Rejections – 35 USC 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:  

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claims 1-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 1, 9, 10 and 14, the phrase, “layered structure exhibits substantially Ohmic behavior” is indefinite in that it fails to point out whether the Ohmic behavior of the layered structure is included or excluded.

In claim 37, the phrase, “has a thickness selected to produce pre-selected optical interference to generate multiple colors, colors of desired wavelength and optimum optical

power output” is indefinite in that it fails to point out what the thickness is and how the thickness produces multiple colors, colors of desired wavelength and optimum optical power output.

### ***Claim Objection***

5. Claims 6 and 12 are objected to because of the following informalities: Claims 6 and 12 include Ni twice in the selected group for the electrically conductive material. Examiner suggests deleting one of the Ni materials. Appropriate correction is required.

### ***Claim Rejections – 35 USC § 103(a)***

6. Claims 15, 17-20, 22-24, 26, 30-39 and 41-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Czerw et al. (U.S. 6,833,201) in view of Celii et al (U.S. 6,274,979).

Czerw discloses an electroluminescent (EL) device comprising a layered structure including

- a) a substrate (2)
- b) an anode electrode layer (4), made of ITO, which is electrically conductive;
- c) a hole transport layer (8) on the anode electrode layer;
- d) a light emissive layer (10) on the hole transport layer;
- e) an electron transport layer (12) located on the light emissive layer; and
- g) a cathode layer (14), comprising Al-Li, which is electrically conductive on the electron transport layer (column 6, lines 39-65 and Figure 3) as in claims 19-20, 26, 33-

35, 42 and 47-48. Czerw further discloses fullerenes, such as C60, are distributed in the EL layers, including the electron transport layer (column 2, lines 20-30) as in claim 30. Czerw discloses a glass (16) which functions as a protective coating on the top surface of the cathode layer (Figure 3) as in claims 43-45. A power supply (20) applies voltage across the anode and cathode layers (column 7, lines 1-7) as in claim 46.

Czerw fails to teach the first and second interfacial layers. Celii teaches an electroluminescent (OLED) device comprising first and second interfacial layers comprising lithium fluoride, where the second interface layer 120 is comprised between an electron transport layer 112 and a cathode layer 122 and the first interface layer 106 is located under the emissive layer 110 (Figure 1, column 2, lines 41-56 and column 4, lines 39-46). The thickness of the LiF is 1.5nm (column 2, lines 45-50) as in claims 22 and 38. Celii teaches the OLED is a tunneling diode (column 5, lines 7-10) as in claim 49. Although Celii does not teach the first interface layer is located between the light emissive layer 110 and electron transport layer 112, Celii teaches the preferred embodiments can be modified (column 4, lines 39-40) and it has been held that rearranging parts of layers of an invention involves only routine skill in the art. In re Japikse, 86 USPQ 70. In claim 15, the phrase, "for improving electrical contact between said layer of light emissive material and said layer of electron transport material" is an intended use, which is given little patentable weight in a product claim. Therefore it would have been obvious to one of ordinary skill in the art to incorporate the first and second interface layers in the EL device of Czerw to improve the luminous properties of the device and improve the electron transfer of the electroluminescent device (column

1, lines 51-62) as in claims 15, 23-24, 41 and 50-53. The hole transport layer has a thickness of 80nm and comprises fullerenes (carbon) bonded with polymeric material (column 2, lines 20-32 and column 7, lines 14-20) which conduct holes, as in claim 17-18, 31 and 36. Because the second interface layer comprises LiF and is located between an electron transport layer and cathode layer, it would have been expected for the second interfacial layer to provide an Ohmic contact between the cathode electrode layer and the electron transport layer. Additionally, because the first interface layer comprises the same material as claimed, it would have been expected for the layer to have the same LUMO and HOMO energy levels as in claim 39.

In claim 37, the phrase, "thickness selected to produce pre-selected optical interference to generate multiple colors, colors of desired wavelength, and optimum optical power output" constitutes a 'capable of' limitation and that such a recitation that an element is 'capable of' performing a function is not a positive limitation but only requires the ability to so perform. In claims 15 and 46 the phrases, "for providing an Ohmic contact" and "for applying a voltage across the anode electrode layer and the cathode electrode layer" are intended uses. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

***Claim Rejections – 35 USC § 103(a)***

7. Claims 25 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Czerw et al. (U.S. 6,833,201) in view of Celii et al (U.S. 6,274,979) further in view of Hung et al (U.S. 6,069,442).

Czerw and Celii are relied upon for instant claim 15. The cited references do not explicitly teach a calcium fluoride compound or tris-(8-hydroxyquinoline)aluminum(Alq). Hung teaches an EL device comprising tris-(8-quinolinato)Aluminum (Alq) along with a fluoride layer which comprises either lithium fluoride or calcium fluoride (column 3, lines 42-50 and column 4, lines 25-35). The cited references are all directed to EL devices with layered materials. Therefore, it would have been obvious to one of ordinary skill in the art to include the tris-(8-quinolinato) Aluminum (Alq) and calcium fluoride in the EL device of Czerw to substantially lower the barrier height of the electron transport (column 4, lines 25-35).

8. Claims 1-14 are allowed. The closest prior art does not teach or suggest the recited light emitting device further including a first layer consisting of fullerenes with a second and third layer, where the thickness of the second layer is selected so that the layered structure exhibits substantially Ohmic behavior across the first, second and third layers. As allowable subject matter has been indicated, applicant's reply must either comply with all formal requirements or specifically traverse each requirement not complied with. See 37 CFR 1.111(b) and MPEP § 707.07(a).

The prior art does not teach motivation or suggestion for modification to make the invention as instantly claimed.

9. Claim 40 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The closest prior art does not teach or suggest the recited light emitting device further including where the organic molecules of the first interfacial layer are selected from the group consisting of 4,4'-bis(carbazol-9-yl)-biphenyl....1,3,5-Tris[5-(4-(1-dimethylethyl)phenyl-1,3,4-oxadiazol-2-yl)]benzene. As allowable subject matter has been indicated, applicant's reply must either comply with all formal requirements or specifically traverse each requirement not complied with. See 37 CFR 1.111(b) and MPEP § 707.07(a).

The prior art does not teach motivation or suggestion for modification to make the invention as instantly claimed.

### ***Response to Arguments***

10. The rejection of claims 47-49 made under 35 U.S.C. 112, second paragraph, is withdrawn due to Applicant addressing the objections made in the 112, second rejection.

The rejection of claims 15, 17-20, 22-26, 30-46 and 48-49 made under 35 U.S.C. 112, first paragraph, is withdrawn due to Applicant's showing support for the



phrase, 'first interfacial layer located between said layer of light emissive material and said electron transport material' and 'a second interfacial layer located between said electron transport layer and said second electrically conductive layer'.

The rejection to the specification is withdrawn due to Applicant's showing original support for a first interfacial layer located between said layer of light emissive material and said electron transport material for improving electrical contact between said layer of light emissive material and said layer of electron transport material and a second interfacial layer located between said electron transport layer and said second electrically conductive layer, said interfacial layer comprising a fluoride compound and support for the amendment citing "the first interfacial layer may be a lithium fluoride (LiF)".

Applicant has filed a terminal disclaimer of copending Application No. 11/257,393. The terminal disclaimer filed on October 9, 2007, disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of copending Application No. 11/257,393 has been reviewed and is accepted; therefore, the obviousness-type double patenting rejection of copending Application No. 11/257,393 is withdrawn.

The obviousness-type double patenting rejection of copending Application No. 11/260,469, is withdrawn, as indicated in the advisory action, mailed on August 17, 2007, due to a different layered structure between the two applications and a lack of the layered structure exhibiting Ohmic behavior.

Applicant's arguments to rejection made under 35 U.S.C. 103(a) as being unpatentable over Czerw et al. (U.S. 6,833,201) are moot based on grounds of new rejection.

### ***Conclusion***

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lawrence Ferguson whose telephone number is 571-272-1522. The examiner can normally be reached on Monday through Friday 9:00 AM – 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Keith Hendricks, can be reached on 571-272-1401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

L. Ferguson



KEITH D. HENDRICKS  
SUPERVISORY PATENT EXAMINER